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EXAMINER
DIVECHA, KAMAL B

ART UNIT	PAPER NUMBER
2151	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

		Application No.	Applicant(s)
Office Action Summary		09/972,462	DELAIRE ET AL.
		Examiner	Art Unit
		KAMAL B. DIVECHA	2151

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>05 October 2001</u>.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-24* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-24* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on <u>05 October 2001</u> is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☐ All   b) ☐ Some *   c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>20020129</u>.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claims 1-24 are presented for the examination.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every

feature of the invention specified in the claims. Therefore, the claimed subject matter and its

limitation in claims 1, 9 and 15 must be shown or the feature(s) canceled from the claim(s). No

new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to

the Office action to avoid abandonment of the application. Any amended replacement drawing

sheet should include all of the figures appearing on the immediate prior version of the sheet,

even if only one figure is being amended. The figure or figure number of an amended drawing

should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure

must be removed from the replacement sheet, and where necessary, the remaining figures must

be renumbered and appropriate changes made to the brief description of the several views of the

drawings for consistency. Additional replacement sheets may be necessary to show the

renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an

application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet"

pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

be notified and informed of any required corrective action in the next Office action. The

objection to the drawings will not be held in abeyance.

Specification

The lengthy specification has not been checked to the extent necessary to determine the

presence of all possible minor errors. Applicant's cooperation is requested in correcting any

errors of which applicant may become aware in the specification.

Claim Objections

1.   Claims 23 and 24 are objected to because of the following informalities: the symbol

"*"used in the relation has multiple meanings such as multiplication and a square root, and in

claim 24 line 3, a typo was encountered.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

1.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

2.   Claims 1-14 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for

failing to particularly point out and distinctly claim the subject matter which applicant regards as

the invention.

- Claim 1 recites the limitation "the first digital data processor" in line 4, 6 and 8-

   10. There is insufficient antecedent basis for this limitation in the claim.

- Claim 7 recites the limitation "interconnect fabric". Applicant fails to teach what

   an interconnect fabric is.

- Claims 1-8 are rejected due to their dependency on claim 1.

- Claim 9 recites the limitation "the host digital data processor". There is

  insufficient antecedent basis for this limitation in the claim.

- Claims 10-14 are rejected due to their dependency on claim 9.

Claim Rejections - 35 USC § 103

3.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the

claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c)

and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4.   Claims 1-3 are rejected under 35 U.S.C. 103(a) as being obvious over Hitz et al. (U. S.

Patent No. 6,751,637 B1) in view of Row et al (U. S. Patent No. 5,163,131).

As per claim 1, Hitz discloses in a storage area network (SAN) of the type having one or

more digital data processors and having a plurality of storage devices, the improvement

comprising (see abstract and fig. 10): the first digital data processor being associated with a

lower capacity bound and upper capacity bound for storage devices added to extend the file

system (fig. 10 item #1022: lower bound and fig. 10 item #1024: upper bound), a manager, in

communication with the first digital data processor (fig. 10 item #1010 and item #1050), that

responds to request on behalf of the first digital data processor for extension of the file system by

assigning one or more further storage devices to the first digital data processor (col. 5 L1-31),

however, Hitz does not explicitly disclose the improvement comprising the step of at least a first

digital data processors in communication access with at least first one of the storage devices, the

first digital data processor having a file system that effects access to that storage device.

Row et al., from the same field of endeavor, explicitly discloses a file server architecture

comprising: a processor in communication access with storage devices, the processor having a

file system that effects access to that storage device (see abstract and fig. 2). Therefore, it would

have been obvious to a person of ordinary skilled in the art at the time the invention was made to

incorporate the teaching of Row as stated above with the system and method of Hitz for the

purpose of having at least a first processor in communication access with storage device and the

first digital data processor having a file system that effects access to that storage device.

One of ordinary skilled in the art would have been motivated because the storage

processor would have provided high speed multiplexed access to an array of mass storage

devices (Row, see abstract).

As per claim 2, Hitz and Row discloses the system as in claim 1, further improvement

wherein the manager identifies a storage device from among the plurality of further storage

devices accessible to the first digital data processor (read as selecting disk from plurality of

disks, Hitz, fig. 5 item #530 and fig. 10) having a capacity in a range between the lower capacity

bound and upper capacity bound, and assigns that storage device to the first digital processor

(Hitz, fig. 5 item #550), however, Hitz does not disclose the improvement wherein the manager

identifies a storage device from among the plurality of further storage devices accessible to the

first digital data processor having a capacity in a range between the lower capacity bound

divided by (s) and upper capacity bound divided by (s), where (s) is one of the file system is not

striped RAID file system and, otherwise, is a number of striped in that file system. But it would

have been obvious to a person of ordinary skilled in the art at the time the invention was made to

modify Hitz method in order to take the number of stripes in that file system in consideration and

divide the lower and upper capacity bound by that number to identify a storage device. One of

ordinary skilled in the art would have been motivated because it would have identified and

allocated a chosen storage device to the blocks of data thus offering enhanced performance.

As per claim 3, it does not teach or further limit over the limitations in claim 1-2.

Therefore, claim 3 is rejected for the same reasons as set forth in claim 1-2.

5.   Claim 4 is rejected under 35 U.S.C. 103(a) as being obvious over Hitz et al. (U. S. Patent

No. 6,751,637 B1) in view of Row et al (U. S. Patent No. 5,163,131), and further in view of

Shimada et al. (U. S. Patent No. 6,832,299 B2).

As per claim 4, Hitz and Row discloses storage area network as in claim 1 and a striped

RAID file system (fig. 1 and col. 5 L13-31), however, Hitz in view of Row does not explicitly

disclose the step wherein the manager assigns a plurality of storage devices having a combined

storage capacity that equals or exceeds the lower capacity bound divided by (s) in the absence of

identifying any storage device having a capacity in a range between the lower capacity bound

and the upper capacity bound, where (s) is one if the file system is not a striped RAID file system

and, otherwise, is a number of stripes in that file system.

Shimada discloses the method for assigning storage devices in a storage network (col. 5

L50-67 to col. 6 L1-5 and fig. 1). Therefore, it would have been obvious to a person of ordinary

skilled in the art at the time the invention was made to modify Shimada to assign a plurality of

storage devices having a combined storage capacity that equals or exceeds the lower capacity

bound divided by (s) and incorporate it with the system and method of Hitz in view of Row in

order for the manager to assign a plurality of storage devices having a combined storage capacity

that equals or exceeds the lower capacity bound divided by (s) in the absence in the absence of

identifying any storage device having a capacity in a range between the lower capacity bound

and the upper capacity bound.

One of ordinary skilled in the art would have been motivated because it would have

provided a larger capacity storage device improving the performance of the overall system.

6.   Claims 5-8 are rejected under 35 U.S.C. 103(a) as being obvious over Hitz et al. (U. S.

Patent No. 6,751,637 B1) in view of Row et al (U. S. Patent No. 5,163,131), and in further view

of "official Notice".

As per claim 5, neither Hitz nor Row discloses the step wherein the manager assigns

storage devices with larger storage capacities before assigning those with smaller storage

capacities, But, it would have been obvious to a person of ordinary skilled in the art at the time

the invention was made to assign storage devices with larger capacities before assigning those

with smaller capacities. One of ordinary skilled in the art would have been motivated because it

would have enhanced systems reliability and performance by using the larger storage resources

first to accommodate the larger files.

As per claim 6, neither Hitz nor Row discloses the step wherein the manager removes

from selection option any storage device whose assignment to the first digital data processor, in

response to a previous file extension request, had failed, But, it would have been obvious to a

person of ordinary skilled in the art at the time the invention was made to remove from the

selection option any storage device whose assignment to the first digital data processor, in

response to a previous file extension request, had failed. One of ordinary skilled in the art would

have been motivated because it would have enhanced systems reliability and performance and

improved the response time by deleting the failed storage devices.

As per claim 7, neither Hitz nor Row discloses the step wherein the manager comprises a

second digital data processor and wherein first and second digital processors are connected to the

SAN via an interconnect fabric, But, it would have been obvious to a person of ordinary skilled

in the art at the time the invention was made to connect the two processor via an interconnect

fabric. One of ordinary skilled in the art would have been motivated because it would have

provided high data rate and a reliable data transfer between the systems.

As per claim 8, neither Hitz nor Row discloses the method comprising an agent

associated with the first digital data processor (read as a program executing in the processor) that

transmits the file extension request from the first digital signal processor to the manager, but it

would have been obvious to a person of ordinary skilled in the art at the time the invention was

made to load a program on a processor wherein upon the execution will transmit the file

extension request from the processor to the manager. One of ordinary skilled in the art would

have been motivated because it would have enabled a centrally controlled file extension server to

manage and expand the storage devices.

7.   Claim 9 is rejected under 35 U.S.C. 103(a) as being obvious over Shimada et al (U. S.

Patent No. 6,832,299 B2) in view of Morley et al (U. S. Patent No. 6,507,890 B1).

As per claim 9, Shimada discloses: a storage area network (fig. 1), comprising: one or

more storage units (fig. 1 item #116, 117, 118, 119); one or more host digital data processors

coupled to the one or more storage units via an interconnect (fig. 1 item #113, and item #117,

118, 116 and fig. 11 item #121); one or more agents, each executing on an associated host digital

data processor (fig. 3 item #302-305) and each in communication with a manager digital data

processor (fig. 11 item #1103: read as manager and processor associated with it in

communication with fig. 11 item #1101: read as a host computer); the one or more agents each

identifying attributes **of any** (i)the host digital data processor with which that agent is associated,

(ii)the interconnect to which that host digital data processor is coupled, and (iii)storage units to

which that host digital data processor is coupled, and communicating those attributes to the host

digital data processor (fig. 3 item #317, 319, 322, 321, and 320 and col. 3 L11-27); the one or

more agents each responding to assignment, by the manager digital data processor, of a storage

unit to the associated host digital data processor(s) by preventing access by that host digital data

processor to others of said storage units in the SAN (col. 3 L1-56 and fig. 1 and fig. 3); at least a

selected one or the host digital data processors having a file system that effects access to that

storage device (fig. 3 item #121 and item #317 and col. 3 L1-10); the manager responds to a

request from the agent associated with the selected host digital data processor for extension of

the file system by assigning one or more further storage devices to the first digital data processor

(col. 5 L1-67 to col. 6 L1-25, col. 1 L46-65 and fig. 3).

Morley, from the same field of endeavor, discloses a system and method for expanding a

log structure in a disk array, the disk array being expanded from M-width to N-width (col. 2

L26-51; fig. 11 item #1100).

Neither of the references explicitly teach the step of at least a selected one or the host

digital data processors having a file system that effects access to that storage device and being

associated with a lower capacity bound divided by (s) and an upper capacity bound divided by

(s) for storage devices added to extend the file system, where (s) is one if the file system is not a

striped RAID file system and, otherwise, is a number of stripes in that file system, however, the

formula or relational phrase disclosed in the limitation are associated with finite number of

devices, which has been disclosed by Morley's method and system. Therefore, it would have

been obvious to a person of ordinary skilled in the art to incorporate the teaching of Morley as

stated above with the system and method of Shimada for adding storage devices in order to

extend the file system.

One of ordinary skilled in the art would have been motivated because it would have

determined the number of storage devices to be added for expanding the disk array having a

particular capacity, thus providing better performance (Morley, col. 1 L26-48). It would have

also enhanced the systems reliability and performance by improving the data transfer rates

between the storage devices. It would have also provided a system having a better efficiency by

assigning the storage devices in accordance with each application program (Shimada, col. 1L46-54).

8.   Claim 10 is rejected under 35 U.S.C. 103(a) as being obvious over Shimada et al (U. S. Patent No. 6,832,299 B2) in view of Morley et al (U. S. Patent No. 6,507,890 B1), and further in view of Wang et al. (U. S. Patent No. 5,928,327).

As per claim 10, Shimada in view of Morley discloses SAN, wherein at least one of the host digital processors includes a software RAID file system having no stripes and number of mirror redundancies (m) (Morley, col. 1 L40-48 and col. 5 L4-47), and manager extends the RAID system, in response to a file extension request, by assigning a number of same-sized storage devices (n) to the requesting host (Morley, col. 6 L49-65), however, Shimada in view of Morley does not explicitly disclose assigning a number of same-sized storage devices to the requesting host in accord with a relation: $n = m + 1$.

Wang, from the same field of endeavor, discloses the method comprising the step of determining a number of storage devices (n) for a RAID file system having no stripes and a number of mirror redundancies (m) in accord with a relation $n = m+1$ (col. 14 L5-15 and col. 21 L30-67 to col. 22 L1-27, Wang has disclosed the relation $1 < m <= n-1$, which is $m > 1$ and $m <= n-1$, and $m < n-1$ or $m = n-1$, which is $m+1=n$, where n is number of storage devices, col. 22 L26 and m is redundant factor). Therefore, it would have been obvious to a person of ordinary skilled in the art at the time the invention was made to incorporate the teaching of Wang as stated above with the system and method of Shimada in view of Morley in order to assign a number of same-sized storage devices to the requesting host in accordance with a relation: $n = m+1$.

One of ordinary skilled in the art would have been motivated because this would have

determined the number of available storage devices or disks in the RAID sub system and adding

finite number of devices to enhance system reliability and performance, which would have

improved the response time of the data access.

9.   Claims 11-14 are rejected under 35 U.S.C. 103(a) as being obvious over Shimada et al

(U. S. Patent No. 6,832,299 B2) in view of Morley et al (U. S. Patent No. 6,507,890 B1), and

further in view of Hitz et al (U. S. Patent No. 6,751,637 B1).

As per claim 11, Shimada in view of Morley discloses SAN, wherein at least one of the

host digital processors includes a software RAID file system having no mirror dependencies

(Morley, col. 1 L40-48 and col. 5 L4-47 and fig. 1), and manager extends the RAID system, in

response to a file extension request, by assigning a number of same-sized storage devices (n) to

the requesting host (Morley, col. 6 L49-65; Shimada, col. 1 L46-50 and fig. 1), however, neither

Shimada nor Morley discloses assigning a number of same-sized storage devices (n) to the

requesting host in accord with a relation: n=s.

Hitz, from the same field of endeavor, discloses the striped RAID file system having N

number of disks (fig. 1 and col. 3 L12-67). Therefore, it would have been obvious to a person of

ordinary skilled in the art at the time the invention was made to assign a number of same sized

storage devices to the requesting host in accord with a relation n = s because as it is shown in fig.

1, one can easily determine number of same-sized storage devices in striped RAID system by

determining the number of stripes where data is written across in the array of parallel disks.

One of ordinary skilled in the art would have been motivated because RAID system

would have provided same storage capacity as a larger single disk drive system, but at lower cost

through the addition of additional disks drives to the array and capable of high speed data

transfer rates (Hitz, col. 1 L20-56). Also, one of the advantage of disk stripping is that it allows

the system to read or write large amounts of data at once and one segment of each drive can be

read at the same time, resulting in faster data accesses for large files (Hitz, col. 2 L10-15).

As per claim 12, Shimada in view of Morley discloses SAN, wherein at least one of the

host digital processors includes a software RAID file system having no mirror dependencies

(Morley, col. 1 L40-48 and col. 5 L4-47 and fig. 1), and manager extends the RAID system, in

response to a file extension request, by assigning a number of same-sized storage devices (n) to

the requesting host (Morley, col. 6 L49-65; Shimada, col. 1 L46-50 and fig. 1), however, neither

Shimada nor Morley discloses assigning a number of same-sized storage devices (n) to the

requesting host in accord with a relation: n=s. Hitz, from the same field of endeavor, discloses

the striped RAID file system having N number of disks and number of stripes greater than two

(fig. 1 and col. 3 L12-67). Therefore, it would have been obvious to a person of ordinary skilled

in the art at the time the invention was made to assign a number of same sized storage devices to

the requesting host in accord with a relation n = s because as it is shown in fig. 1, one can easily

determine number of same-sized storage devices in striped RAID system by determining the

number of stripes where data is written across in the array of parallel disks. One of ordinary

skilled in the art would have been motivated because of the same reasons as set forth in claim 11

above.

As per claim 13, Shimada in view of Morley discloses SAN, wherein at least one of the host digital processors includes a software RAID file system having a number of mirror redundancies for each stripe (Morley, col. 1 L40-48 and col. 5 L4-47 and fig. 1), and manager extends the RAID system, in response to a file extension request, by assigning a number of same-sized storage devices (n) to the requesting host (Morley, col. 6 L49-65; Shimada, col. 1 L46-50 and fig. 1). Hitz discloses the striped RAID file system having N number of disks and number of stripes (fig. 1 and col. 3 L12-67), however, neither of the references above teach assigning a number of same sized storage devices to the requesting host in accord with a relation: $n = s * (m+1)$, which is a finite number (x). Further, Morley teaches the method of expanding the disk array from M-width to N-width, in other words, a finite number (x) of disks have been added to expand the array (col. 2 L52-65; fig. 11 item #1100). Therefore, it would have been obvious to a person of ordinary skilled in the art at the time the invention was made to modify Shimada, Morley and Hitz in order to assign a number of storage devices in accord with a relation $n = s*(m+1)$. One of ordinary skilled in the art would have been motivated because of the same reasons as set forth in claim 11 above.

As per claim 14, Shimada, Morley and Hitz discloses the SAN as in claim 9, wherein at least one of the host digital processors includes a software RAID file system having number of stripes for each mirror redundancy (Morley, col. 1 L40-48 and col. 5 L4-47 and fig. 1; Hitz, fig. 1), and manager extends the RAID system, in response to a file extension request, by assigning a number of same-sized storage devices (n) to the requesting host (Morley, col. 6 L49-65; Shimada, col. 1 L46-50 and fig. 1), however, none of the references above disclose assigning a number of same-sized storage devices (n) to the requesting host in accord with a relation: n =

(m+1)*s, which is a finite number (x). Further, Morley teaches the method of expanding the disk

array from M-width to N-width, in other words, a finite number (x) of disks have been added to

expand the array (col. 2 L52-65; fig. 11 item #1100). Therefore, it would have been obvious to a

person of ordinary skilled in the art at the time the invention was made to modify Shimada,

Morley and Hitz in order to assign a number of storage devices in accord with a relation n =

(m+1)*s. One of ordinary skilled in the art would have been motivated because of the same

reasons as set forth in claim 11 above.

10.   Claims 15-18 and 21 are rejected under 35 U.S.C. 103(a) as being obvious over Morley et

al. (U. S. Patent No. 6,507,890 B1) in view of Hitz et al. (U. S. Patent No. 6,751,637 B1), and

further in view of Wang et al. (U. S. Patent No. 5,928,327).

As per claim 15, Morley in view of Hitz discloses a method of extending a file system

associated with a first digital data processor connected to a storage area network (Morley, see

abstract, col. 2 L26-39 and col. 1 L40-48), comprising: selecting from the identified storage

devices at least one storage device having a maximum storage capacity (Hitz, fig. 5 item #530

and fig. 10 item #1024), a striped RAID file system with lower capacity bound and upper

capacity bound (col. 2 L1-30 and fig. 10), and assigning the selected storage device to the

requesting first digital data processor (Morley, col. 6 L60-62 and col. 4 L1-12 and col. 1 L40-

48), however, Morley in view of Hitz does not disclose identifying one or more storage devices

from a group of storage devices accessible to the first digital data processor, in response to a

request for file system extension, having a pre-defined storage type and having storage capacities

in a range between a lower capacity bound divided by (s) and an upper capacity bound divided

by (s), where (s) is one if file system is not a striped RAID file system, and, otherwise, is a

number of stripes in that file system.

Wang, from the same field of endeavor, discloses identifying one or more storage devices

from a group of storage devices accessible to the first digital data processor (col. 4 L25-65, fig. 8

item #801 and fig. 1A). Therefore, it would have been obvious to a person of ordinary skilled in

the art at the time the invention was made to incorporate the teaching of Wang as stated above

with the system and method of Morley in view of Hitz in order to identify one or more storage

devices from a group of storage devices.

One of ordinary skilled in the art would have been motivated because it would have

increased storage capacity of the storage device configured with hierarchical architecture by

expanding a log structure in a disk array, wherein the disk array is being expanded from M-width

to N-width, thus having particular capacity providing better performance (Morley, col. 1 L31-

48).

As per claim 16, Morley in view of Hitz discloses selecting a plurality of storage devices

among the accessible storage devices (Hitz, fig. 5 item #530 and fig. 10 item #1022...#1024),

however, Morley in view of Hitz does not explicitly disclose the method comprising, in the

absence of identification of any storage device having a storage capacity between the lower and

the upper storage capacities, selecting a plurality of storage devices from among the accessible

storage devices having a pre-defined storage type such that a combined storage capacity of the

selected storage devices equals or exceeds the lower capacity bound divided by (s). But, it would

have been obvious to a person of ordinary skilled in the art to modify Morley in view Hitz's

method in order for selecting a plurality of storage devices from among the accessible storage

devices having a pre-defined storage type such that a combined storage capacity of the selected

storage devices equals or exceeds the lower capacity bound divided by (s). One of ordinary

skilled in the art would have been motivated because it would have provided a larger capacity

storage device improving the performance of the overall system.

As per claim 17, Morley discloses a method further comprising assigning the plurality of

storage devices to the requesting first digital data processor (col. 6 L60-62, col. 4 L1-12 and col.

1 L40-44).

As per claim 18, Morley discloses a method wherein the step of selecting a plurality of

storage devices further includes selecting the storage devices in descending order by storage

capacity (col. 6 L23-36, fig. 1 and col. 4 L32-41).

As per claim 21, Morley in view of Hitz discloses a system and method for expanding a

log structure in a disk array (read as extend RAID file system, Morley, col. 2 L25-39) of a first

digital data processor connected to a storage area network (Morley, col. 1 L40-48; Hitz, fig. 10),

having a number of stripes (s) and no mirror dependencies (Hitz, fig. 1 item #140 and #142)

wherein first stripe comprises Parity block 0 and data blocks 0 to n-1 (i.e. $s = 1 + (n-1)$ or $n=s$,

where n is the number of disks), and further discloses the step of assigning the segments (read as

storage devices) to the particular systems (Morley, col. 6 L60-62 and col. 4 L1-10), however,

Morley in view of Hitz does not disclose a method as stated further comprising determining a

number (n) of same-sized storage devices to be assigned to the first digital data processor in

accord with a relation: $n = s$.

Wang, from the same field of endeavor, discloses the method comprising the step of

determining a number (n) of same-sized storage devices for a RAID file system (Wang, col. 14

L5-15). Therefore, it would have been obvious to a person of ordinary skilled in the art at the time the invention was made to modify Wang in order to determine the a number n of same-sized storage devices to be assigned to the first digital data processor in accord with a relation n = s and incorporate the modification with the system and method of Morley in view of Hitz.

One of ordinary skilled in the art would have been motivated because it would have located the available storage devices and would have increased the storage capacity through the addition of additional disks drives to the array, thus enhancing the systems reliability and performance.

11.   Claim 19 is rejected under 35 U.S.C. 103(a) as being obvious over Morley et al. (U. S. Patent No. 6,507,890 B1) in view of Hitz et al. (U. S. Patent No. 6,751,637 B1), and further in view of Wang et al. (U. S. Patent No. 5,928,327), and further in view of "Official Notice".

As per claim 19, neither of the references above teaches a method comprising a step of removing from selection any storage device whose assignment to the first digital data processor previously failed, But it would have been obvious to a person of ordinary skilled in the art at the time the invention was made to consider a step of removing the failed disk or storage device from the selection. One of ordinary skilled in the art would have been motivated because it would have enhanced systems reliability and performance and improved the response time by deleting the failed storage devices.

12.   Claims 20, 23 and 24 are rejected under 35 U.S.C. 103(a) as being obvious over Morley et al. (U. S. Patent No. 6,507,890 B1) in view of Wang et al. (U. S. Patent No. 5,928,327).

As per claim 20, Morley discloses a system and method for expanding a log structure in a

disk array (read as extend RAID file system, col. 2 L25-39) comprising the step of assigning free

segments (read as assigning free storage devices or adding disks to storage array) to a particular

system (read system as a processor, col. 6 L60-61 and col. 4 L32-41 and col. 1 L40-49; fig. 12

item # 1200), however, Morley does not explicitly disclose the method comprising determining a

number of same sized storage devices to be assigned to the processor and determining a number

of storage devices (n) for a RAID file system having no stripes and a number of mirror

redundancies (m) in accord with a relation n = m+1.

Wang, from the same field of endeavor, discloses the method comprising the step of

determining a number of storage devices (n) for a RAID file system having no stripes and a

number of mirror redundancies (m) in accord with a relation n = m+1 (col. 14 L5-15 and col. 21

L30-67 to col. 22 L1-27, Wang has disclosed the relation 1< m <= n-1, which is m >1 and m < =

n-1, and m <n-1 or m = n-1, which is m+1=n, where n is number of storage devices, col. 22 L26

and m is redundant factor). Therefore, it would have been obvious to a person of ordinary skilled

in the art at the time the invention was made to incorporate the teaching of Wang as stated above

with the system and method of Morley in order to determine a number of storage devices for

RAID file system in accordance with the relation n = m+1.

One of ordinary skilled in the art would have been motivated because this would have

determined the total number of available storage devices or disks in the RAID sub system and

adding more storage devices to enhance system reliability and performance.

As per claim 23, Morley and Wang discloses a system and method for expanding a log structure in a disk array (read as extend RAID file system, Morley, col. 2 L25-39) of a first digital data processor connected to a storage area network (col. 1 L40-48) and further discloses the step of assigning or adding the disks to the storage arrays (Morley, fig. 12 item # 1200), and the method comprising the step of determining a number of storage devices (n) for a RAID file system (Wang, col. 14 L5-15), however, Morley and Wang does not explicitly disclose the method as stated comprising determining a number of storage devices (n) for a RAID file system having a number of mirror redundancies (m) for each strip (s) in accord with a relation $n = s * (m + 1)$. But, it would have been obvious to a person of ordinary skilled in the art at the time the invention was made to modify Morley and Wang and determine a number of storage devices (n) for a RAID file system having a number of mirror redundancies (m) for each strip in accord with a relation $n = s * (m + 1)$. One of ordinary skilled in the art would have been motivated because this would have determined the exact number of available storage devices or disks in the RAID sub-system and adding more storage devices to enhance system reliability and performance.

As per claim 24, Morley and Wang discloses a system and method for expanding a log structure in a disk array (read as extend RAID file system, Morley, col. 2 L25-39) of a first digital data processor connected to a storage area network (col. 1 L40-48) and further discloses the step of assigning or adding the disks to the storage arrays (Morley, fig. 12 item # 1200), and the method comprising the step of determining a number of storage devices (n) for a RAID file system (Wang, col. 14 L5-15), however, Morley and Wang does not explicitly disclose the method as stated comprising determining a number of storage devices (n) for a RAID file system having a number of stripes (s) for each mirror redundancy (m) in accord with a relation $n =$

(m+1)*s. But, it would have been obvious to a person of ordinary skilled in the art at the time the

invention was made to modify Morley and Wang and determine a number of storage devices (n)

for a RAID file system having a number of stripes (s) for each mirror redundancy (m) in accord

with a relation n = (m+1)*s. One of ordinary skilled in the art would have been motivated

because this would have determined the exact number of available storage devices or disks in the

RAID sub-system and adding more storage devices to enhance system reliability and

performance and further improving the response time.

13.   Claim 22 is rejected under 35 U.S.C. 103(a) as being obvious over Morley et al. (U. S.

Patent No. 6,507,890 B1) in view of Hitz et al (U. S. Patent No. 6,751,637 B1).

As per claim 22, Morley discloses a system and method for expanding a log structure in a

disk array (read as extend RAID file system, Morley, col. 2 L25-39) of a first digital data

processor connected to a storage area network (Morley, col. 1 L40-48), however, Morley does

not disclose a method as stated comprising determining a number of storage devices (n) for

RAID file system having no mirror redundancies and a number of stripes (s) greater than two in

accord with a relation n = s.

Hitz, from the same field of endeavor, discloses the method of allocating files in a file

system integrated with a RAID sub-system having no mirror redundancies and a number of

stripes greater than two (abstract and fig. 1 item #140, #142 and so on and fig. 9D; col. 2 L10-

30) wherein first stripe comprises Parity block 0 and data blocks 0 to n-1 (i.e. s = 1 + (n-1) or

n=s, where n is the number of storage devices (therefore, number of storage devices would have

been easily determined from the relation n = s). Therefore, it would have been obvious to a

person of ordinary skilled in the art at the time the invention was made to incorporate the

teaching of Hitz in order to determine a number of storage devices (n) for RAID file system

having no mirror redundancies and a number of stripes greater than two in accord with a relation

$n = s$.

One of ordinary skilled in the art would have been motivated because it would have

located the available storage devices and would have increased the storage capacity through the

addition of additional disks drives to the array, thus enhancing the systems reliability and

performance.

Additional References

14.   The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure.

    a.   Cheng et al. U. S. Patent No. 5,701,516.

    b.   Morley et al. U. S. Patent No. 6,611,852 B1.

    c.   Wilson U. S. Patent No. 6,151,331.

    d.   Brown et al. U. S. Patent No. 6,148,414.

    e.   Parks et al. U. S. Patent No. 6,598,174 B1.

Conclusion

15.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to KAMAL B. DIVECHA whose telephone number is 571-272-

5863. The examiner can normally be reached on 9.00am-5.30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Zarni Maung can be reached on 571-272-3939. The fax phone number for the

organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ZARNI MAUNG
SUPERVISORY PATENT EXAMI^ -